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SOURCE Veterinariya, No 11, 1947, pp 16 - 21.THIRTY YEARS OF SOVIET VETERINARY MICROBIOLOGY

Ya. Ye. Kolyakov

Following the October Revolution, Soviet veterinary microbiology quickly expanded, and in subsequent years was able to fulfill the tasks assigned to it under the Five-Year Plans.

The number of veterinary microbiological institutions, veterinary higher educational institutions (VUZ), and faculties, as well as the number of veterinary microbiologists has increased significantly during the Soviet period. In the USSR, there are 35 chairs of microbiology within veterinary VUZ and faculties, scores of biological factories and institutions which prepare bacterial and sera biologicals, as well as a sizable network of republic and regional scientific-research institutions, at the head of which is the All-Union Institute of Experimental Veterinary Medicine (VIEV).

Soviet veterinary specialists point with pride to their achievements of the past 30 years. The guiding principle in the work of Soviet microbiologists and epizootologists has been the complete elimination of farm animal infections which are most harmful from the standpoint of the national economy. This principle finds its expression in the works of Stalin Prize Laureate K. I. Skryabin, and other veterinary scientists.

During the initial stages of its development, Soviet veterinary microbiology was concerned chiefly with immunobiology, immunodiagnosis, immunoprophylaxis, and immunotherapy.

Immunodiagnosis by the complement-fixation reaction (RSK) method has been highly developed and has been put in practice for diagnosing glanders (Ruzhentsev, N. Ye. Tsvetkov), mating diseases (Kolyakov, Petroshevskaya), and peripneumonia of cattle (Ebert, Peretts, and Ivanov). In 1946, an RSK method for diagnosing necrobacillosis of horses was developed and suggested by Kolyakov and Zakharov. In recent years, RSK has been used extensively in diagnosing brucellosis.

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The serodiagnosis of anthrax by the precipitation method has been widely implemented in the Soviet Union. Serodiagnosis by the agglutination-reaction method (RA) has been put to wide use in combating brucellosis, infectious abortion of mares, pullorum, and other salmonellosis. The RA method also has been used for detecting hidden and chronic forms of swine erysipelas.

The allergy method for diagnosing glanders is a Russian discovery (Gel'man, Kalning, 1891). The original diagnostic allergen for the diagnosis of paratuberculosis (paratuberculin) was suggested by Vishnevskiy.

Some of the vaccines made available to veterinary medicine by Soviet researchers include anthrax vaccine STI (Ginsburg); aluminum-hydroxide vaccine against smallpox of sheep (Likhachev); crystal-violet vaccine against braxy in sheep (Volkova), and a vaccine against leptospirosis of farm animals. Special interest is being given to the semiliquid formol vaccine against swine erysipelas and the formol vaccine against "emkar," suggested by Professor S. N. Muromtsev, Stalin Prize Laureate. While solving the problems concerned with the protection of livestock, Soviet microbiologists widely introduced a vaccine against paratyphoid of calves (Mikhin, deceased, and Vyshellesskiy). Special interest is shown in the immunization of lambs against dysentery by the inoculation of pregnant sheep (Polykovskiy, Volkova).

Active immunization of horses with tetanus anatoxin has been put to wide use, especially in the case of military horses; the technique of preparing this anatoxin was improved in the Military Veterinary Scientific-Research Institute (N. Ye. Tsvetkov, Strelkov, and Deminov).

Significant achievements of Soviet microbiology in the field of active immunization against virus infections include use of crystal-violet vaccine against swine plague; aluminum-hydroxide vaccine against smallpox in sheep; tolulol and formol vaccine against rinderpest, and a vaccine against smallpox and diphtheria of poultry (pigeon virus).

The number of immunoserums used for prophylactic and therapeutic purposes in veterinary practice has been expanded considerably.

In many fields of infectious-diseases pathology, Soviet microbiologists introduced much new data which placed the study of infectious diseases on a high level. In the study of anthrax, Soviet science provided an effective and harmless vaccine, STI, which was tested on millions of farm animals, and discovered dissociation of *B. anthracis*, the anthrax bacteriophage (Terent'yev), and bivalent vaccines against anthrax and emkar (Kovalenko, Kagan). Much new information was introduced in the study of the antigenic structure of the capsule material of *B. anthracis* (Nikiforova, Revo) and the genesis of immunity. Promising results were obtained in the use of dead vaccines for immunization against anthrax.

Soviet microbiology attained leadership in the scientific world in the study of glanders. Some of the more important works on the immunology of glanders include Academician S. N. Vyshellesskiy's experiments on explaining the possibility of artificially raising the specific resistance of horses to experimental infection with glanders; works on the study of the response of horses which show a positive mallein reaction to super-infection (Oleynik); thorough studies of the state of allergy and dynamics of allergy reactions in the case of different forms of glanders (N. Ye. Tsvetkov, Milovzorov, Glukhov, and others); and experiments on raising, apart from their mothers, healthy colts showing a positive mallein reaction (Glukhov, Volkov, Solonitsyn). Veterinary workers have experienced considerable success in diagnosing glanders by the serological and allergy methods. The extensive and systematic use of RSK in Soviet laboratories cannot be found in any other foreign country. Soviet mallein and components for RSK are distinguished by their unusual specific activity.

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Rinderpest has been eliminated in the Soviet Union for quite some time. In eliminating plague, use was made of an antiplague serum, of the toluene type, and a formol vaccine, both of which received a high evaluation by practical and scientific veterinary workers.

Veterinary microbiologists made significant progress in the study and liquidation of peripneumonia of cattle. The preparation of a highly specific lymph antigen for RSK made possible the detection of forms of peripneumonia which were not detected through clinical examinations. Detailed study of the causative factor of peripneumonia made it possible to prepare a highly active cultured vaccine. The work on the study of virus carriers in the case of peripneumonia is of great importance (Derbedenev).

Valuable work was done in the USSR in the study of brucellosis. Many questions on the dynamics of antibodies were explained on the basis of extensive serological examinations of animals for brucellosis. The RSK for brucellosis became of practical value in the diagnosis of brucellosis. Academician S. N. Vyshel'skiy suggested the use of abortin for the diagnosis of brucellosis in cattle. A Soviet diagnostic preparation, "brucellizate" (VIEM), which does not bring about sensitization in healthy animals, has been used extensively on sheep.

A valuable and original achievement of Soviet science is the solution of the problem of spontaneous recovery, clinically and bacteriologically, of animals afflicted with brucellosis (Savel'yev, Nikolayev, Tsion).

In the period 1928 - 1930, Soviet microbiologists studied the etiology of paratyphoid and colibacillosis, which are considered to be most damaging to young livestock (Vyshel'skiy, Subotnik, Milovzov, and Bityarskiy). As a result of Vyshel'skiy's and Mikhin's work, preventative inoculations with formol vaccine were put into practice. Special recognition was given to the combined method of inoculation which consisted of injecting a bivalent serum against paratyphoid and colibacillosis into calves within 24 hours after birth and subsequent vaccination after 10 - 14 days (Mikhin). By 1938, more than 300,000 head of cattle were inoculated against paratyphoid, with favorable results in all cases. Subsequently, there was developed and introduced into practice a vaccine against paratyphoid of swine.

New directions in combating the indicated infections of young livestock are the successful experiments of phagotherapy and phagoprophylaxis with Gaertner's coli and polyphages (Kvesitadze, 1945). Favorable results also have been obtained in the phagodiagnosis of paratyphoid of young swine (Likhachev).

An original direction in combating paratyphoid and colibacillosis in young livestock is the use of Mechnikov's idea of therapy with lactic acid bacteria. The introduction of lactobacillin or acidophylic curdled milk into calves' feed was put in practice on a large scale.

Important achievements have been realized in the study of anaerobic infections. At present, there are available effective and specific methods for combating principal anaerobic infections. Vaccines which were prepared in the Soviet Union have been used extensively in practice to combat "emkar" (Muromtsev's formol vaccine), dysentery of lambs (Polykovskiy, Volkova), and braxy of sheep (Volkova).

Significant progress has been made in the prophylaxis of tetanus and the immunization of horses with alum antoxin. Academician L. S. Shtern's idea was used in developing an effective method of subarachnoid introduction of antitetanus serum for therapeutic purposes (Maksimov, Belenkiy).

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Soviet researchers successfully studied the problems of necrobacillosis (Revnivkh, Nikolayevskiy, Kovalenko, and Kagan), and botulism of horses (Dukalov).

Veterinary mycology has developed as a new branch of Soviet microbiology. In 1938, a heretofore unknown disease of horses was discovered; for a long time this disease was identified as N Z (neizvestnoye zabolevaniye). Later Soviet researchers uncovered the mystery of N Z and established the causative agent of this disease.

In the past 15 years, Soviet microbiology has given considerable attention to the problem of filterable viruses. Of all infectious diseases of farm animals, virus diseases have an especially deleterious effect on the economy of many countries. The Hoof and Mouth Disease Institute developed an RSK method of serological diagnosis of the disease (Sokvaralidze). This discovery, which was made prior to the announcement of German work on this disease, later proved valuable for differentiating types of hoof-and-mouth-disease viruses. Studies of different methods of active immunization against the disease, as well as of immunity to this infection, were made by Skomorokhov, Ratner, and Kindyakov.

In 1932, Kolyakov, Pinus, and N. A. Romanov isolated, for the first time in the Soviet Union, the virus of infectious anemia (INAN). Soviet researchers have made a deep study of the tenacious (tenatsitetnyy) properties of the virus INAN to different physical and chemical factors, the durability of the virus in hay and water (Muratov, Rodionov, Olaynik), and the role of stinging insects in the distribution of this infection (Rodionov, Laktionov). The research on premonition and presence of virulicidal antibodies in the case of INAN are considered to be of special theoretical and practical interest (Kolyakov, Stepanov). Large amounts of experimental material have been accumulated as a result of studies in connection with infectious anemia.

In 1932, I. G. Levenber (Moscow) and S. N. Vyshellesskiy (Alma-Ata), working independently, isolated, for the first time in the Soviet Union, the virus of infectious encephalomyelitis (IEM). At present, there is available a collection of strains of this virus isolated in various parts of the Soviet Union. The biology and resistance of this virus have been studied in detail. It has been established that IEM in the Soviet Union is of a peculiar variety which differs sharply from foreign forms of IEM in that it is accompanied by parenchymatous hepatitis. The virus was adapted to growth on chicken embryos. The important phases in the pathogenesis of the disease and particularly the role of bile poisoning (zhelchnoye otravleniye) were explained by Kolyakov.

Other important achievements in the field of virus infections include experiments using the crystal-violet vaccine against swine erysipelas (Kolesko, 1946); preparation of an active immunoserum against Anjeszky's disease by Solomkin in 1942; effective introduction into practice of the original aluminum-hydroxide vaccine against smallpox of sheep, and the formol-embryo vaccine against bird plague which proved quite successful in tests by Svintsov.

Soviet microbiologists have discovered a number of causative agents of infectious diseases in a relatively short time. These include leptospirosis of farm animals (Terskiy, Zemskov, Mikhin); stachybotriotoxicosis (by a group of researchers, 1933); necrobacillosis of deer which earlier was called hoof disease of deer (Revnivkh, 1929 - 1931); and virus of infectious encephalomyelitis in horses (Levenberg, Vyshellesskiy, 1932).

Important studies also have been conducted in the study of dysentery of swine (Shchennikov), spirochetosis of swine (Lvov), "suylyuk" of horses (Zarubinskiy), anthrax in sheep (Lakhimov, Volkova, and Dukalov) and others.

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During the past 3 years, veterinary researchers have been studying the problem of antibiotics (Laktionova, Lomakin, and Vasilenko).

All important new discoveries in general microbiology have been exploited and used by Soviet researchers in furthering veterinary microbiology. Soviet researchers have accumulated valuable theoretical and practical material on the subjects of bacteriophagy, dissociation, receptor analysis, anatoxins, antibiotics, chemotherapy of bacterial infections, and new types of vaccines (BCG, brucellosis strain No 19, and Buaven antigens).

Soviet scientists have realized certain achievements in microbiological methodology and technique. Kozlovskiy's original method of staining brucella has been widely accepted in practice.

To increase the durability of biologicals, a method of drying vaccines, serums, and antigens at a temperature below freezing in a vacuum apparatus has been developed and put into practice. The State Institute for the Control of Veterinary Biologicals and certain biological plants have developed new methods for preparing and testing Soviet biologicals which will make it possible to retain their high quality and activity.

Veterinary microbiology and epizootology passed a stiff test during World War II. The Veterinary Service of the Soviet Army showed that epizootics can be prevented and rapidly suppressed under difficult wartime conditions. The knowledge and experience gained in the field of microbiology were made available to practical workers for preventing and combating infectious diseases in the front lines and forward areas.

Microbiological works on tuberculosis, glanders, and infectious anemia have been published in many monographs, in works of institutes, and the journal Veterinariya.

Outstanding Soviet microbiologists who have been awarded the Stalin Prize include S. N. Vyshel'skiy, S. N. Muromtsev, N. N. Ginsburg, N. V. Ikhachev, I. I. Kulesko, A. A. Volkova, and S. Ya. Lyubashenko.

A few of the outstanding Soviet veterinary microbiologists who are now deceased are I. Ya. Sadovskiy (local immunity), Mikhin (author of a microbiology textbook), and Ruzhentsev (authority on glanders).

Veterinary microbiology is being developed in a number of scientific-research institutions, the most important being the All-Union Institute of Veterinary Medicine, which was established by order of Lenin. Among the leading institutes which provided a rich base for the development of veterinary microbiology are the Ukrainian Institute of Experimental Veterinary Medicine, Military Veterinary Scientific-Research Institute, Military Veterinary Academy, All-Union Institute on the Control of Veterinary Preparations, All-Union Scientific-Research Laboratory on the Study of Poisonous Fungi (yadovityye grabik), Veterinary-Dermatological Institute, as well as many veterinary-bacteriological institutes in Soviet republics.

These institutes are working daily on problems connected with the scientific-research plan of the Stalin Five-Year Plan. They are also playing an important part in the training of future scientific researchers.

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